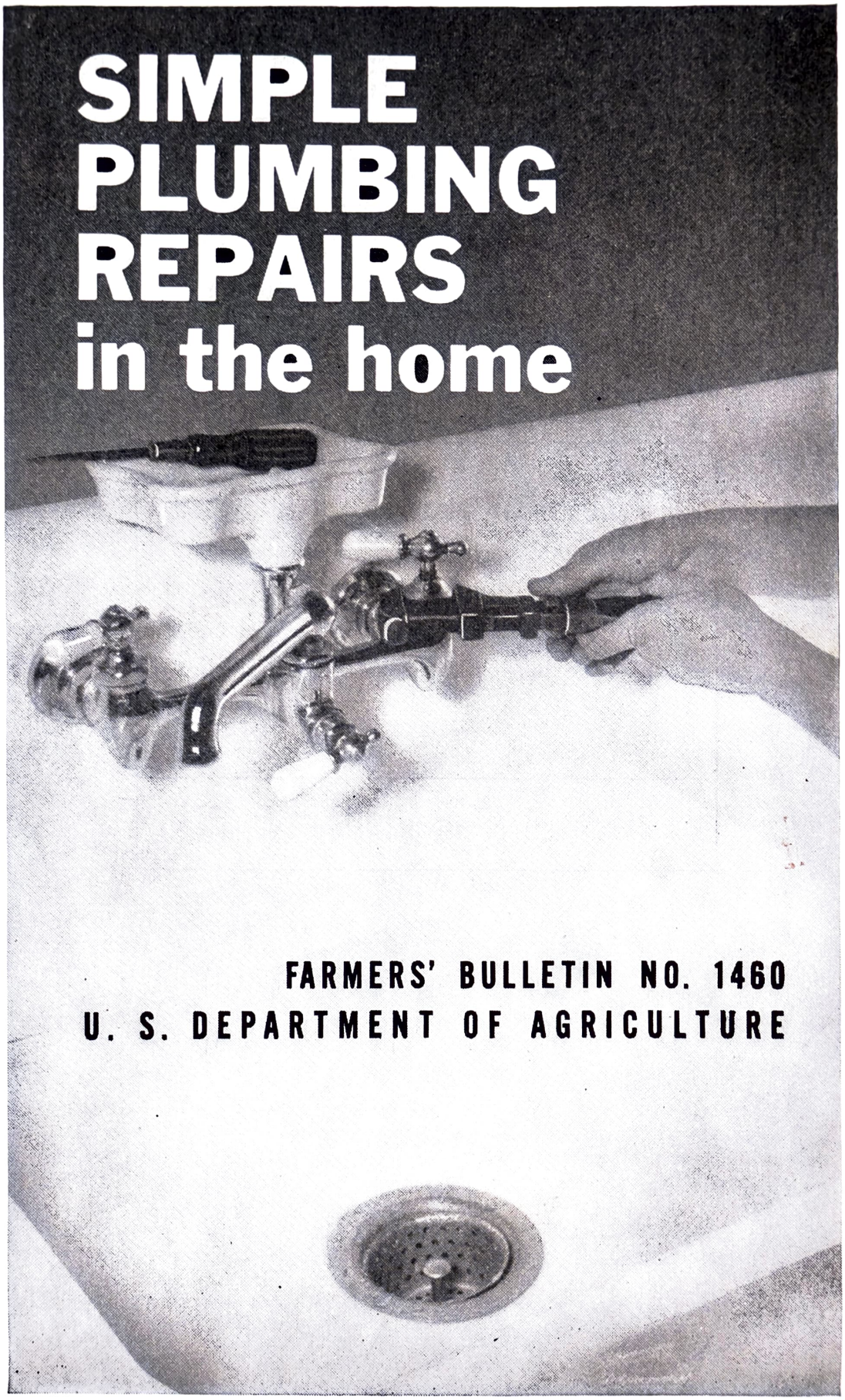
SIMPLE PLUMBING REPAIRS in the home



FARMERS' BULLETIN NO. 1460
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PLUMBING often gets out of order. Smooth, satisfactory operation depends on prompt attention to little repair jobs. This bulletin describes simple ways of doing the little things, with the aid of a few simple tools.

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SIMPLE PLUMBING REPAIRS IN THE HOME

By GEORGE M. WARREN, *associate hydraulic engineer, Division of Structures, Bureau of Agricultural Engineering* [1]

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HOW best to make small plumbing repairs is a problem that every householder has to face at some time. Being able to make the repairs himself often saves delay, trouble, and expense, particularly on the farm. Where local or State plumbing regulations are in force, however, and extensive repairs or alterations are considered, he should make sure that the work is duly authorized and that it is done by a properly qualified plumber. Afterward, he should have samples of the water tested by local or State health authorities. Few realize the potential danger lurking in leaky house plumbing and sewer piping that may allow sewage or other impurities to enter the water supply.

In making repairs it is often necessary to tighten or to loosen a screw or nut, and the householder is sometimes uncertain in which direction it should be turned. To tighten an ordinary right-hand screw, nut, or bolt, first think of the head of the part to be turned as being the face of a clock and of the screw driver or wrench as the shaft that turns the clock hands; then rotate the tool from left to right, in the same direction that the clock hands move. To unscrew or loosen, rotate the tool counterclockwise, that is, from right to left. Undue strain should be avoided, as it may result in the part or parts being broken. Small brass screws and stems are easily twisted off and made useless, especially if a large tool is used to turn them.

REPAIRING FAUCETS

SEAT WASHERS

Badly worn washers make faucets noisy, hard to operate, and wasteful of water. Moderate force on the handle of a faucet in good repair should stop all flow and drip. An ordinary half-inch T-handle compression faucet that closes against the pressure of the water is shown in figure 1. In replacing the seat washer, shut off the water to the faucet. Unscrew the cap nut with a monkey wrench. (Placing cloth or thick paper between the jaws of the wrench saves mar-

[1] Slightly revised by J. W. Rockey, agricultural engineer, Division of Farm Buildings and Rural Housing, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration.

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ring the cap nut.) Take hold of the faucet handle and unscrew the stem from the body of the faucet. With a screw driver remove the washer screw at the bottom of the stem. This screw is often hard to start. Applying one or two drops of kerosene and lightly tapping the head of the screw may help to loosen it in the stem. Use strong, even force on the screw driver, the blade of which should have a good square edge to fit the slot. The head of the screw, if already corroded and weakened, often splits before the shank turns in the stem. If it splits, deepen the slot in the head with a hacksaw, cutting a little into the shank of the screw. No harm is done if the saw cuts slightly into the stem of the faucet. The washer screw may now be turned with a small screw driver. Replace the old washer with a new one, replace the washer screw, screw the stem into the faucet, and screw down the cap nut. Faucet washers cost very little and a small supply of needed sizes should be kept in the home. If none is at hand, a temporary washer may be cut from a piece of leather, rubber, or sheet packing. Leather is preferable on cold-water faucets and rubber on hot-water faucets.

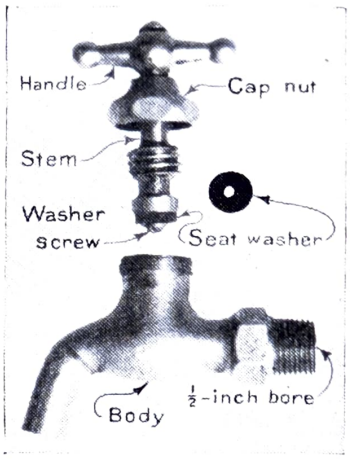
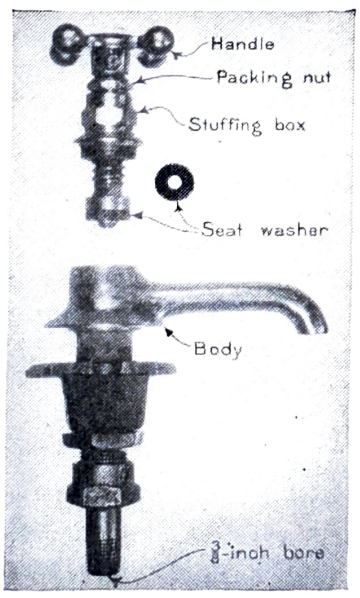


Figure 1.—Ordinary compression faucet.

An ordinary ⅜-inch compression faucet for a washstand is shown in figure 2. In replacing the seat washer, shut off the water to the faucet and open the faucet one or two turns of the handle. With a monkey wrench on the hexagonal part of the stuffing box unscrew the stuffing box from the body of the faucet. Lift out the stem, replace the old washer with a new one, as previously described, and screw the stuffing box into the body.

A worn washer with constant leakage over the seat of a compression faucet, together with grit lodging there, often causes the seat to become cut, nicked, and grooved. The trouble occurs more often in hot-water than in cold-water faucets. Such seats can easily be reground or squared with a simple seat-dressing tool, two types of which are shown in figure 3, *A* and *B*. Seat dressers are available from hardware and plumbing supply dealers, and their use saves buying new faucets. To dress the seat, unscrew the stem from the body to the faucet, as described above. Screw the adjustable, threaded cone of the tool (fig. 3, *A*) down into the body of the faucet, as shown in figure 3, *C*, thus centering it over the seat. With the hand, as shown in figure 3, *D*, gently rotate the wheel handle at the top of the tool several times, and the cutter on the bottom of the stem squares the seat. Turn the faucet bottom side up and shake out the cuttings. If it is not practicable to turn the faucet, the cuttings

Figure 2.—Compression faucet for a washstand.



may be flushed out by turning on the water momentarily. Reassemble the faucet and turn on the water to wash out any remaining cuttings.

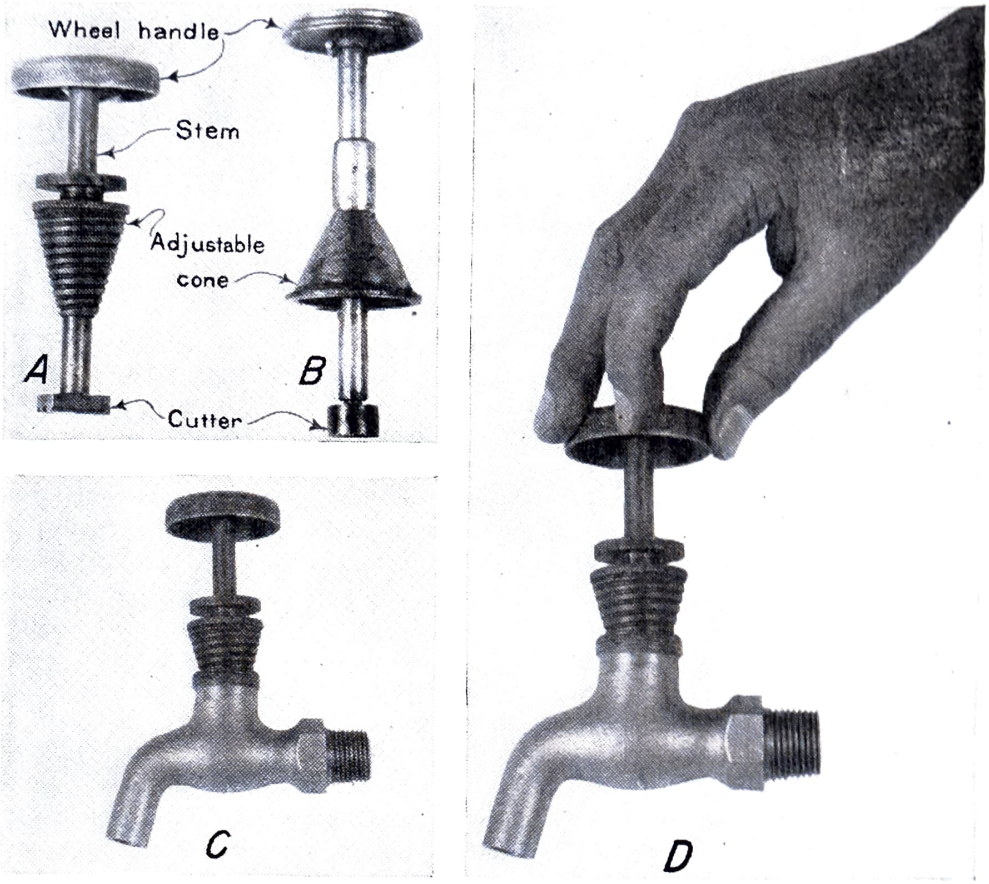


Figure 3.—Faucet seat dressers: *A*, With inside adjustable cone; *B*, with outside adjustable cone; *C*, dresser *A* screwed into a compression faucet; *D*, rotating the wheel handle and cutter.

Seat washers are subject to damage from metal filings left in newly installed water pipes. A good plumber, before screwing up a piece of pipe, always stands the pipe on end and raps it with a hammer to clear the bore.

An ordinary ½-inch lever-handle Fuller faucet that closes with the pressure is illustrated in figure 4, *A*. As shown in figure 4, *B*, the bottom of the spindle is eccentric, so that a slight turning of the handle moves the rubber ball to and from the beveled seat. In replacing the ball shut off the water to the faucet. Unscrew the body from the tailpiece with the hands or with a monkey wrench on the hexagonal part of the body of the faucet. It may be necessary to apply a wrench to the hexagonal nut on the tailpiece and press the wrench downward on the right to prevent unscrewing the tailpiece. Unscrew the stem nut, which holds the brass cap and rubber ball on the stem. Put on a new ball and replace cap and nut. Red rubber balls are considered better than black for hot-water faucets. Avoid using too large a ball, as swelling of the rubber may hinder the flow. Screw the faucet into the tailpiece. Just before the joint closes or "makes up", wrap a little string packing or candle wicking around the thread on the faucet to make the joint watertight.

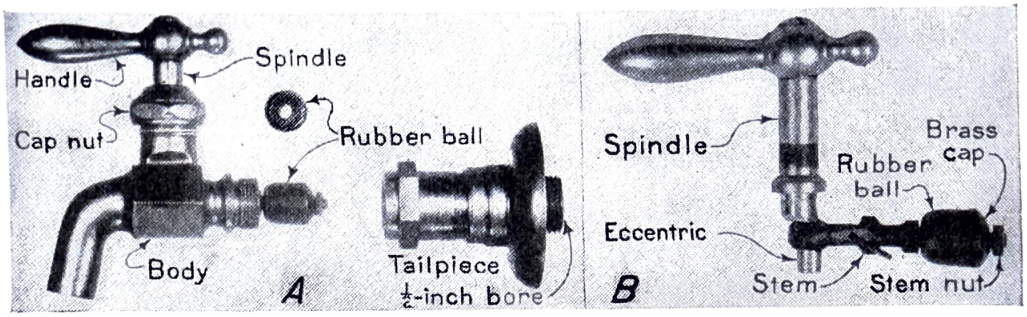


Figure 4.—Fuller faucet: *A*, Body unscrewed from tailpiece; *B*, spindle and stem removed from body.

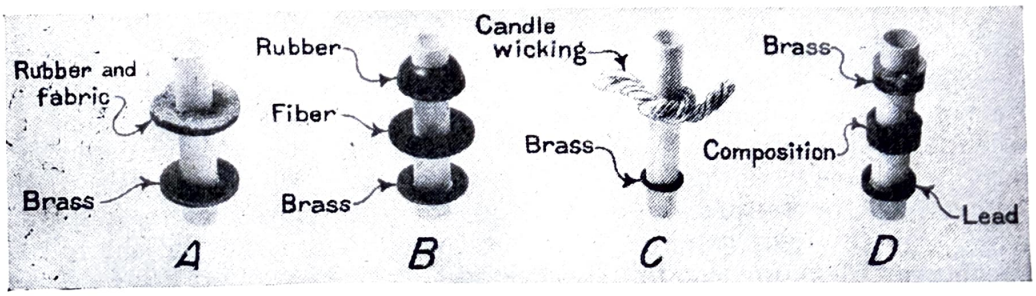
TOP WASHERS AND PACKINGS

A top washer or packing snugly fitting the stem is necessary to prevent leakage upward through the cap nut when a faucet is opened. If the space is too tightly packed, the stem binds, making it hard to operate the faucet; if the space is too loosely packed, water spurts from the top of the cap nut. A soft rubber-and-fabric top washer suitable for the compression faucet shown in figure 1 is illustrated in figure 5, *A*. This washer is one-eighth of an inch thick and rests on the top of the body of the faucet, making a watertight joint when the cap nut is screwed down. Just below the soft washer and inside the top of the body a thin brass washer is placed to take the wear when the faucet is fully opened. These washers are separated in the illustration but are together when placed in a faucet.

New faucets of the kind shown in figure 1 usually have the top washers shown in figure 5, *B*. The rubber washer fills the space beneath the cap nut, and the thin fiber and brass washers are for the purposes described above. If no top washer is available, the space may be packed with candle wicking or soft twine, to which a little mutton or beef tallow should be applied to lubricate the stem, to preserve the packing, and to make it more resistant to water.

When placing the top washer or washers on a compression faucet of the kind shown in figure 1, it is unnecessary to shut off the water provided the faucet is closed. With the right hand keep the faucet closed and with a monkey wrench in the left hand unscrew the cap nut. Unscrew the handle screw and remove handle and cap nut. Put on new washers as shown in figure 5, *A* or *B*, and reassemble the parts.

Figure 5.—Top washers and packings: *A*, Top washers commonly used in ordinary compression faucets (fig. 1); *B*, top washers that fill the space beneath the cap nut (fig. 1); *C*, candlewick packing and brass washer for washstand faucet (fig. 2); *D*, spindle packing for Fuller faucet (fig. 4).



The stem packing for the washstand faucet shown in figure 2 is illustrated in figure 5, *C*. The packing space is very small and is filled with candle wicking lubricated with tallow. There is a thin brass friction washer in the bottom of the stuffing box, and a hexagonal packing nut screws into the top of the box. In renewing the candle wicking, keep the faucet closed. Unscrew the packing nut with a monkey wrench, wrap a little wicking around the stem, and screw the packing nut down against the wicking and into the stuffing box.

Spindle packing for a Fuller faucet (fig. 4) is shown in figure 5, *D*, and consists of three collars or rings obtainable from plumbing dealers for a few cents. A lead ring or packing about one-eighth of an inch thick goes first (lowest) on the spindle; then a rubber-and-fabric composition packing about one-fourth of an inch thick; then a brass packing about one-fourth of an inch thick. Screwing down the cap nut compresses the composition packing, and the metal packings take up friction and wear. To put in new packings, shut off the water from the faucet and remove the handle and cap nut, as described in connection with compression faucets.

FIXING STOP AND WASTE COCKS

An adjustable socket-lever handle, ground key, flat-way stop and waste cock to shut off water to part or all of a piping system and to drain the higher situated pipes from which the flow is cut off is shown in figure 6, *A*. A stop and waste should always be placed on the house supply pipe just inside the house or the cellar wall. They are very useful on branch pipes from a cellar or kitchen to upstairs or back rooms subject to freezing temperatures or other temporary discontinuance of the supply. The disassembled parts, all of which except the handle are brass, are shown in figure 6, *B*. The key or plug is ground to a watertight fit in the body of the cock, and water is turned on or off by giving the handle a quarter turn. Turning the

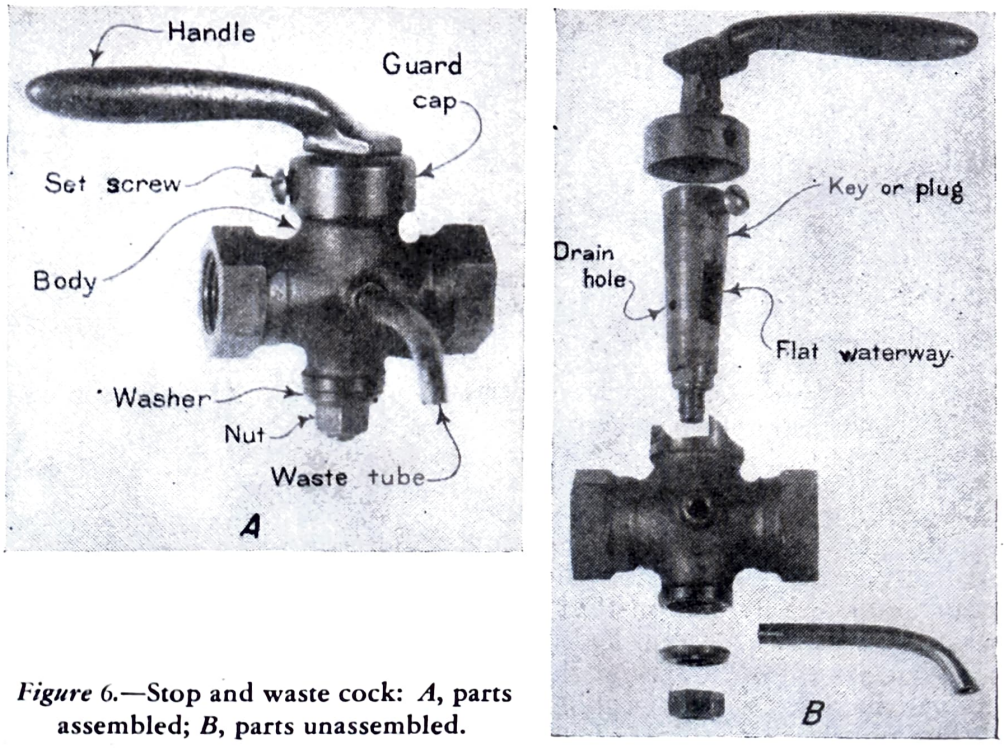


Figure 6.—Stop and waste cock: *A*, parts assembled; *B*, parts unassembled.

handle crosswise of the pipe shuts off the supply, and the dead water drains back through the small round hole in the side of the plug and out the waste tube.

Many stop and waste cocks have broken or bent handles or are otherwise made useless because people do not understand them. As received from dealers, the nut on the bottom of the plug is generally screwed tight, making it difficult or impossible to turn the handle and plug. Long periods of disuse frequently cause the plug to stick fast in the body. The plug is easily loosened by slightly unscrewing the bottom nut and lightly striking the lower end of the plug a few times with a hammer. Slight leakage caused by wear of the plug or dirt around it may be prevented by cleaning the plug and tightening the bottom nut. A plug badly worn from long or continual use can be reground, but it is usually better and cheaper to get a new plug or a complete new cock.

REPLACING BALL COCKS

An ordinary compound-lever ball cock to control the water supply in a flush tank is shown in figure 7, *A*. The float ball and the seat washer on the bottom of the plunger are the only parts likely to

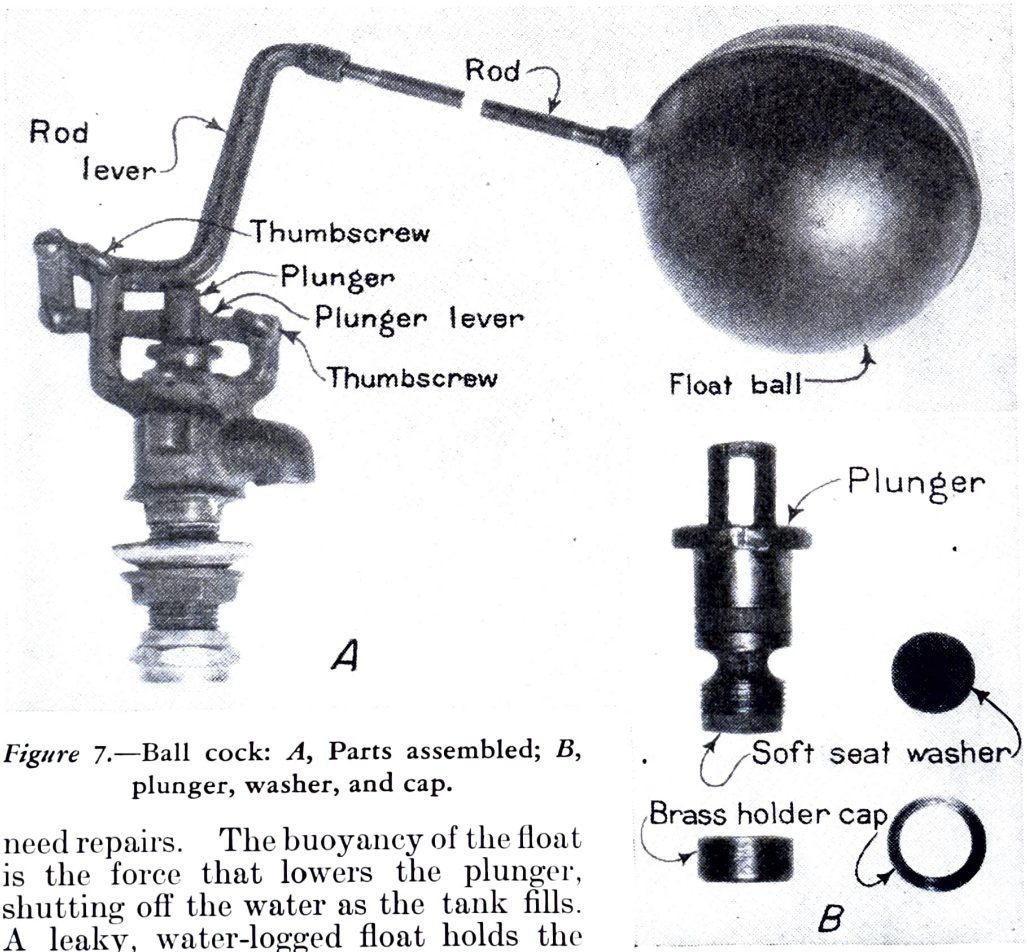


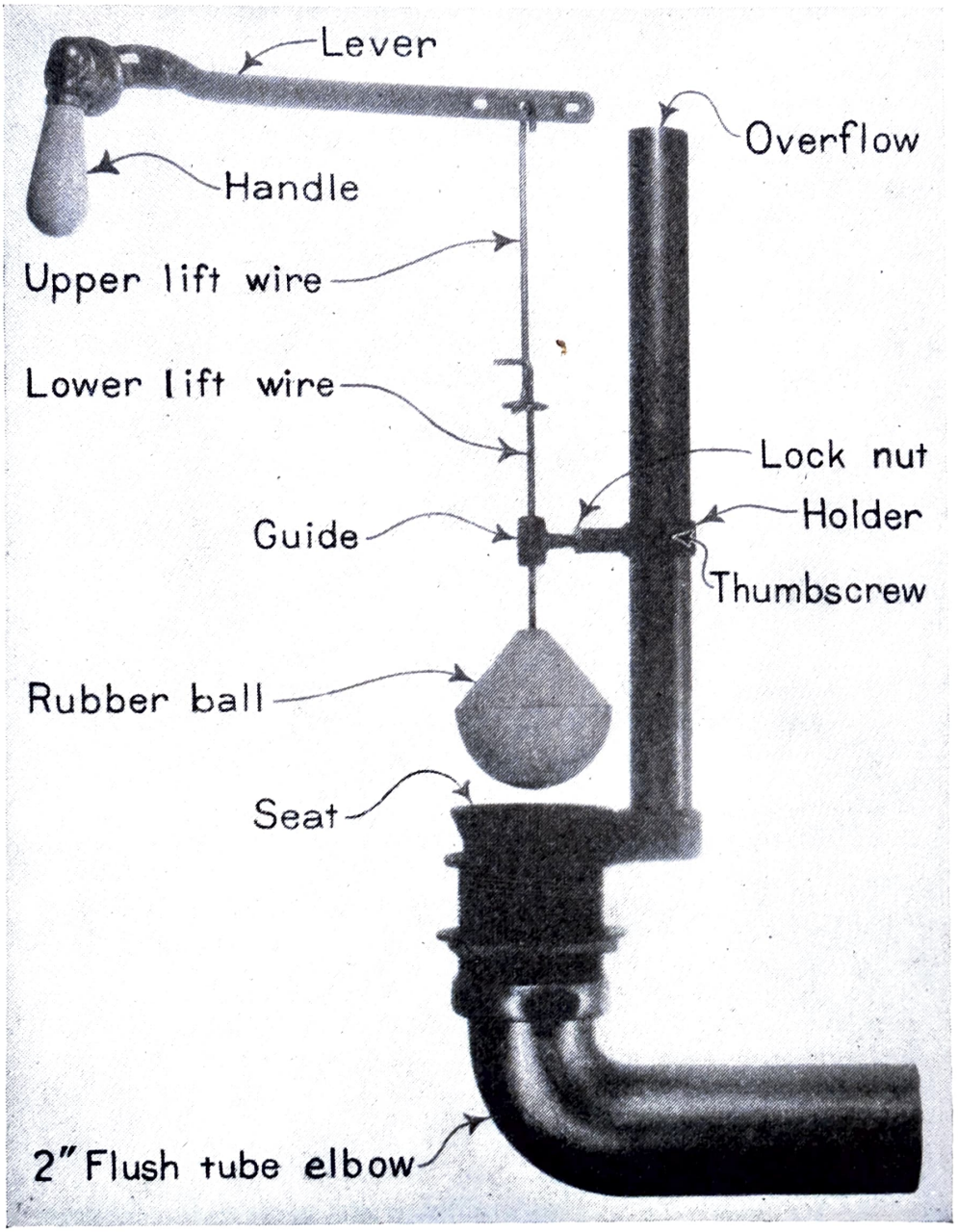
Figure 7.—Ball cock: *A*, Parts assembled; *B*, plunger, washer, and cap.

need repairs. The buoyancy of the float is the force that lowers the plunger, shutting off the water as the tank fills. A leaky, water-logged float holds the plunger up, permitting constant flow and waste of water. A small leak in a copper float can be soldered; but if in bad condition, the float should be replaced by a new one. Good copper, bakelite, or hard-rubber floats are available at little cost.

The plunger and the washer-holder cap that screws on the bottom

of the plunger are shown in figure 7, *B*. The washer should be of soft rubber or leather, because the force that holds it to its seat is not heavy. The cap is thin brass. In replacing the washer, shut off the water and drain the tank. Unscrew the two thumbscrews that pivot the float-rod lever and the plunger lever. Push the two levers to the left, drawing the plunger lever through the head of the plunger. Lift out the plunger, unscrew the cap on the bottom, insert a soft, new washer, and reassemble the parts. The cap may be so corroded and weakened that it breaks during removal from the plunger. A new cap is then necessary, and it is well to have one or two on hand. When putting a washer on a ball cock, examine the seat to see that it is free of nicks and grit. The seat may need regrinding, as explained under compression faucets (p. 2).

Figure 8.—Flush valve for low tank.



ADJUSTING FLUSH VALVES FOR LOW TANKS

A common type of flush valve for a low tank is shown in figure 8. Probably no other plumbing in the home needs attention so often. It is under water and subject to fouling and neglect. The hollow rubber ball gets out of shape and fails to drop squarely into the hollowed seat. The handle and lever fail to work smoothly or the lift wires get out of plumb, causing the ball to remain up when it should drop to its seat.

To repair, stop inflow to the tank by holding up the float of the ball cock or supporting it with a stick. Drain the tank by raising the rubber ball. If the ball is worn, is out of shape, or has lost its elasticity, unscrew the lower lift wire from the ball and replace it with a new one. A 2½-inch rubber ball costs very little and a new one should always be kept in the house. The lift wires should be straight and plumb. The lower lift wire is readily fitted over the center of the valve by means of the adjustable guide holder. By loosening the thumbscrew, the holder is raised, lowered, or rotated about the overflow tube. The horizontal position of the guide is fixed exactly over the center of the valve by loosening the lock nut and turning the guide screw. These adjustments are very important. The upper lift wire should loop into the lever armhole nearest to a vertical from the center of the valve. A tank should empty within 10 seconds. Owing to lengthening of the rubber ball and insufficient rise from its seat, the time may be longer than 10 seconds and the flush correspondingly weak. This may be overcome by shortening the loop in the upper lift wire. A drop or two of lubricating oil on the lever mechanism makes it work more smoothly.

CLEANING CLOGGED PIPES

Rust and dirt in water pipes are more or less successfully removed as follows:

1. Tie a piece of small, stout cord to each end of a 2-foot length of small chain. Each piece of cord should be a little longer than the length of pipe to be cleaned. Attach the free end of one of the cords to a stiff steel wire and push the wire and cord through the pipe. By means of the cords pull the chain back and forth through the pipe, and then thoroughly flush the pipe with clean water under strong pressure. Long lines may be opened at intervals and cleaned section by section.
2. Use a swab or wire brush attached to a small steel or brass rod.
3. Flush with a powerful hand pump.
4. Fill the pipe with diluted muriatic acid and allow it to stand in the pipe long enough for the acid to act. If the treatment is unsuccessful it should be repeated. A mixture of 1 part of acid and 7 parts of water allowed to stand overnight in 1,000 feet of badly rusted 1-inch pipe has given good results. After the acid treatment the pipe should be flushed thoroughly with clean water to remove as fully as possible all dirt, rust, and traces of acid.

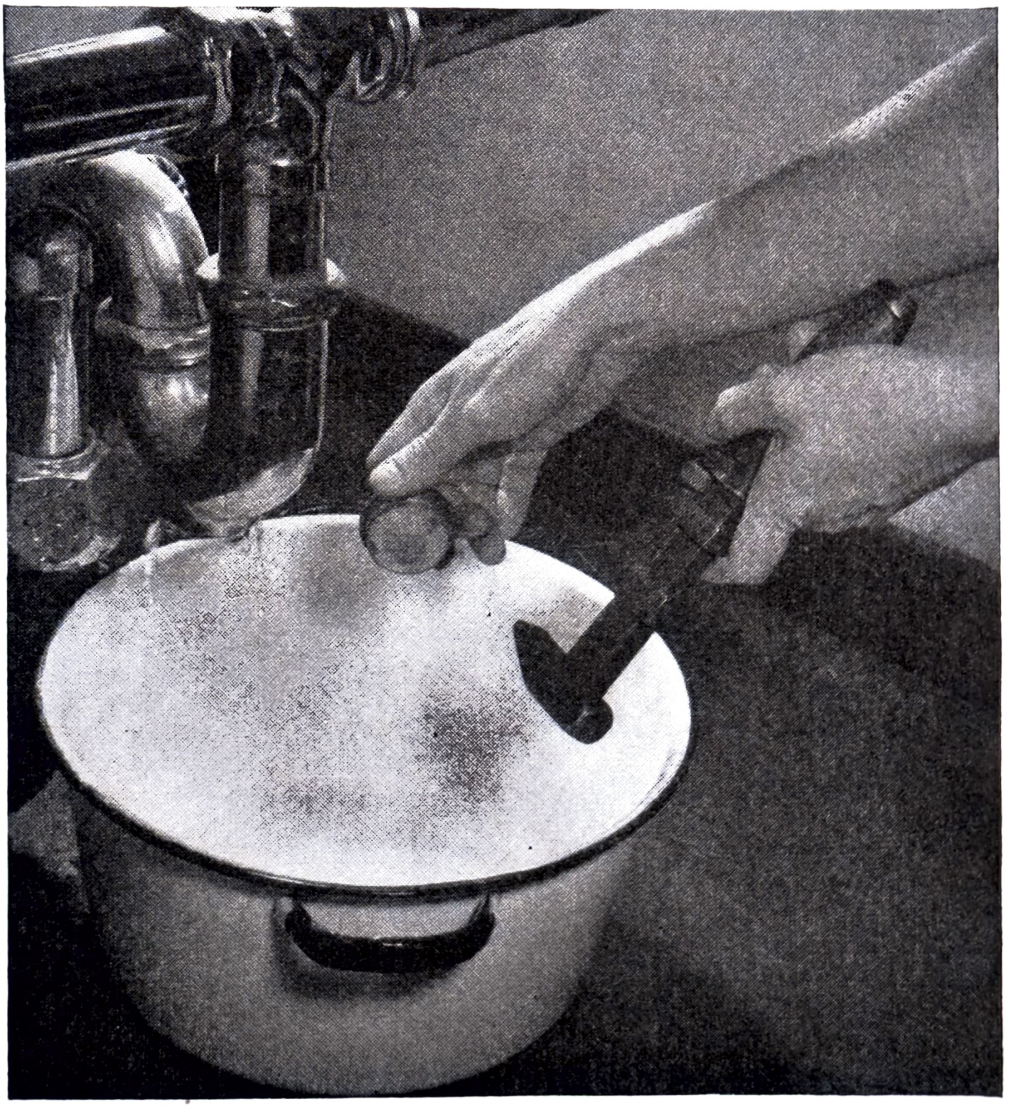
When new piping is put in, abrupt turns are sometimes made with T branches instead of elbows. The unused leg of the branch can be closed with a screw plug, permitting easy access to the interior of the pipe.

Caution: When a stop and waste (or valve) on a water service is closed to permit cleaning or repairs, care should be taken to prevent

the formation of a vacuum in the high parts of the water piping and the connections to plumbing fixtures; ***otherwise, siphon action may draw pollution from water closets having water-controlled or seat-operated flush valves and from bathtubs, washbasins, laundry tubs, or other fixtures in which the spout (discharge end of the water line) is lower than the fixture rim, or worse, below the fixture overflow.*** Vacuum and siphon action may be destroyed by opening the highest connected faucet or an air cock in the top of the water line or by equipping the system with suitable automatic vacuum breakers.

All waste pipes and traps are subject to fouling. Dirt collects in the bottom, and grease adheres to the sides. The usual way of clearing ordinary fixture traps is to unscrew the clean-out plug, as shown in figure 9, and wash out the obstructing matter or pull it out with a wire bent to form a hook. Small obstructions are often forced down or drawn up by the use of a simple rubber force cup, sometimes called "the plumber's friend" (fig. 10). The fixture is partly filled with

Figure 9.—Cleaning out a sink trap.



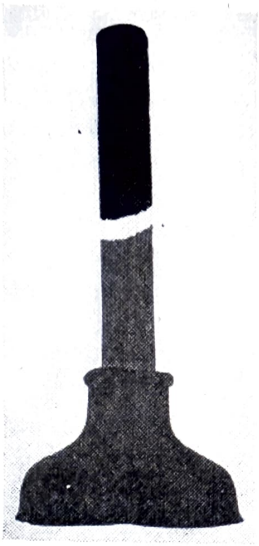
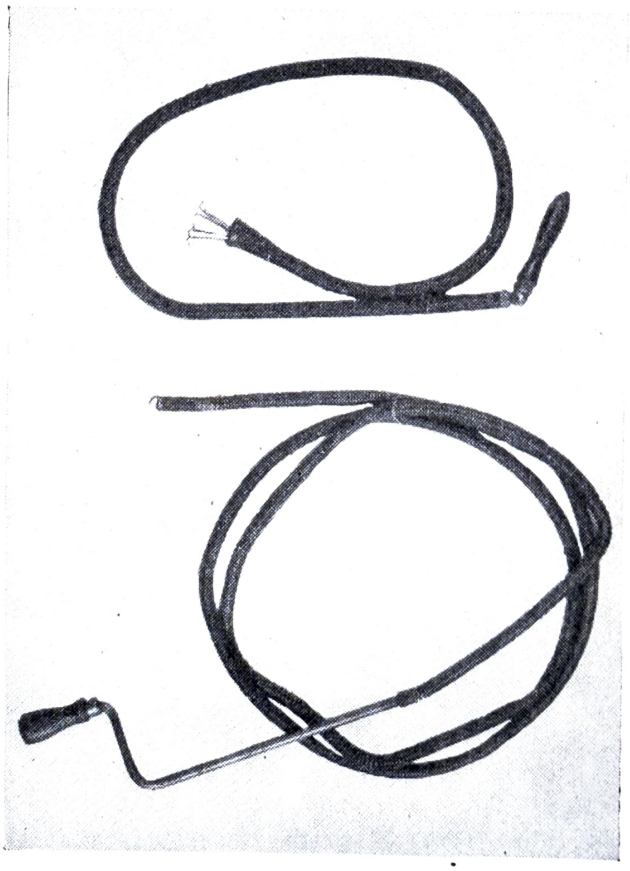


Figure 10.—Rubber force cup.

water and the force cup placed over the fixture outlet. The wood handle of the cup is then worked rapidly down and up, causing alternate expulsion of the water from beneath the cup and suction upward through the waste pipe and trap. If a trap and the waste pipe from it are clogged with grease, hair, or lint, it is best to open or disconnect the trap and dig out the greasy matter with a stick or wire. The use of chemical solvents in waste pipes is explained in Farmers' Bulletin 1426, Farm Plumbing.

A variety of inexpensive flexible-coil wire augers and sewer rods are available for removing obstructions—mainly newspapers, rags, toilet articles, grease, garbage, or other solids—from traps, drains, and sewers. The growth of roots in sewers and drains causes much trouble that better workmanship in making the joints would have avoided. Augers and rods come in various sizes and lengths. Stock lengths for clean-out augers for closet bowls are 3, 6, and 9 feet. Two kinds of flexible augers for general purposes are shown in figure 11. The upper is 4 feet long and has a small steel cable from the handle to the wire hooks. The hooks can be drawn into the coil, facilitating entry into a trap. The lower auger is 8 feet long and has the crank handle and corkscrew point generally preferred for closet-bowl work. Placing a few sheets of toilet paper in the bowl and then flushing usually indicates whether the obstruction has been dislodged.

Figure 11.—Coil-spring steel augers for removing obstructions from drains.



Flexible coil steel waste-pipe cleaners commonly come in diameters of 3/16, 1/4, 3/8, 1/2, and 5/8 inch and in lengths of 6, 9, 15, 25, 50, and 100 feet. The small sizes are useful in sink, lavatory, and bathtub traps and waste pipes.

Flat-steel sewer rods, equipped with either an oval or a revolving spear point and an automatic grip handle, come in stock lengths of 25, 50, 75, and 100 feet, in widths of 1/4 to 1 1/2 inches, and in thicknesses of 1/16 and 1/8 inch.

A rod ⅛-inch thick is desirable for ordinary sewer-cleaning purposes. Round wooden sewer rods in 3- or 4-foot lengths with hook couplings, wire sewer brushes, gouges, scrapers, root cutters, and other devices are on the market or can be made on the farm for cleaning clogged drain and sewer pipes.

THAWING PIPES

The middle of a frozen pipe should never be thawed first, because expansion of the water confined by ice on both sides may burst the pipe. When thawing a water pipe, work toward the supply, opening a faucet to show when the flow starts. When thawing a waste or sewer pipe, work upward from the lower end to permit the water to drain away.

It is simple and effective to thaw a frozen pipe with boiling water, hot cloths, or heat from an electric lamp, heater, or special electrical apparatus. ***Because of the danger of shock, however, electricity should be used only by experienced workers.*** Where there is no danger of fire a torch or burning newspaper run back and forth along the frozen pipe gives quick results.

Underground or otherwise inaccessible pipes may be thawed as follows: Open the frozen water pipe on the house end. Insert one end of a small pipe or tube. With the aid of a funnel at the other end of the small pipe pour boiling water into it and push it forward as the ice melts. A piece of rubber tubing may be used to connect the funnel to the thaw pipe. Hold the funnel higher than the frozen pipe, so that the hot water has head and forces the cooled water back to the opening, where it may be caught in a pail. The head may be increased and the funnel may be used more conveniently if an elbow and a piece of vertical pipe are added to the outer end of the thaw pipe, as shown in figure 12. Add more thaw pipe at the outer end until a passage is made through the ice. Withdraw the thaw pipe quickly after the flow starts. Do not stop the flow until

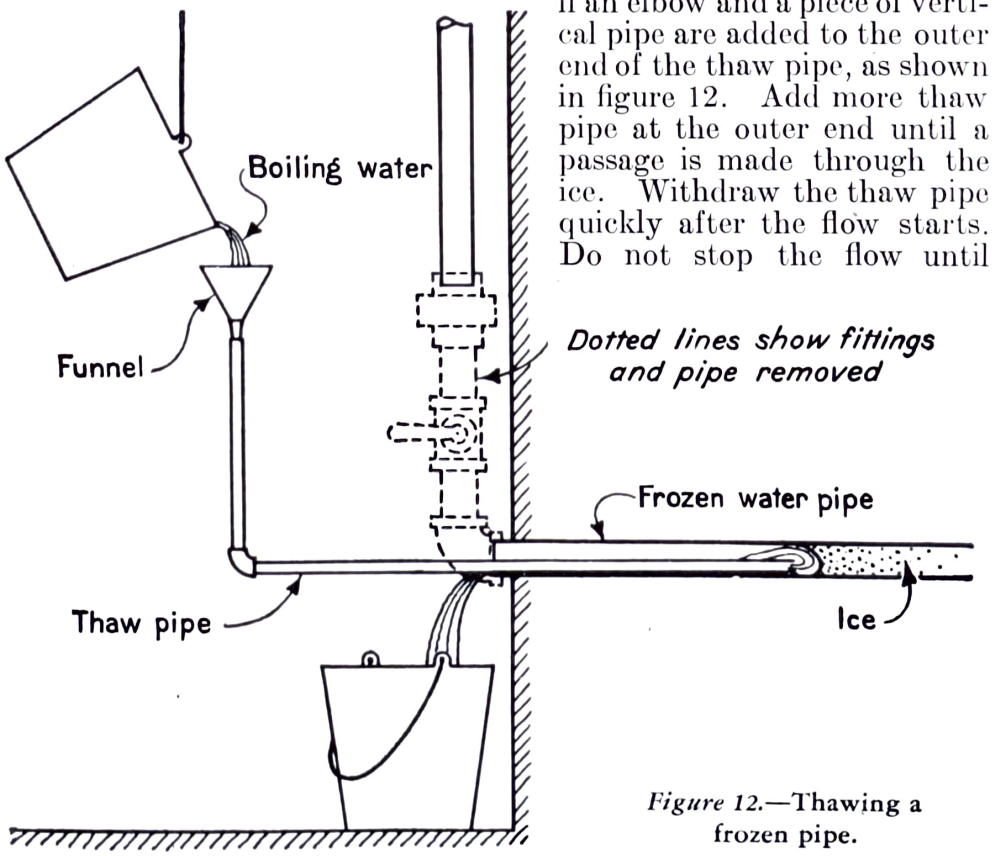


Figure 12.—Thawing a frozen pipe.

the thaw pipe is fully removed and the frozen pipe is cleared of ice.

A small force pump is often used instead of a funnel and is much to be preferred for opening a long piece of pipe. If available, a jet of steam may be used instead of hot water; as it is hotter, the thawing is more rapid.

Frozen traps and waste pipes are sometimes thawed by pouring in caustic soda or lye, obtainable at grocery stores. ***Chemicals of this character should be labeled "Poison" and should be kept where children cannot get them.*** To prevent freezing, the water in the traps of a vacant house should be removed during cold weather, and the traps filled with kerosene, crude glycerin, or a very strong brine made of common salt and water, or other substance mentioned in Farmers' Bulletin 1426, Farm Plumbing.

REMOVING SCALE FROM WATER BACKS AND COILS

Hard water causes a limy deposit, or scale, on the inside of water backs and heating coils, which retards the circulation and heating of the water and, by closure of the bore, may prove dangerous. Continued neglect, moreover, makes removal increasingly difficult.

The water back or coil should be removed from the fire box. At the union or other joints nearest the fire box disconnect all pipes and unscrew them from the water back. If there is a clamp that holds the fire-brick lining against the oven, loosen it and remove side and end linings. Lift out the water back. Soft scale or sludge may be removed by pounding the water back with a mallet or hammer and then flushing with a strong jet of water. A long gouge or chisel is used on surfaces that can be reached. Sometimes the water back is heated in a blacksmith's forge and then pounded, but unless carefully done this treatment may break it.

Waters of varying chemical make-up cause scale differing in composition and hardness. Ordinary limestone (calcium carbonate) scale, if not too thick, may readily be removed with muriatic acid. Gypsum (calcium sulphate) scale is hard and resistant and with other materials in their more compact forms is little affected by muriatic acid. The water back should be laid on the ground or floor and filled with a strong solution of the acid in water. The strength of the solution should vary with the amount of deposit, the ordinary mixture being 1 part of acid and 5 to 7 parts of water. If the deposit is very thick, the acid needs little dilution. Commercial muriatic acid comes in bottles that should be ***labeled "Muriatic acid—poison" and, like the chemicals previously mentioned, should be kept where children cannot get it.*** Heating the water back hastens the action of the acid. At the end of an hour or two, or sooner if the deposit is dissolved, pour the solution from the water back and flush it thoroughly with hot water to clean out the acid. If all the deposit has not been removed, repeat the operation, making sure that the acid is completely washed out before replacing the water back. It is important to have the water back level when it is replaced; use a spirit level for this purpose.

Similar methods can be used with copper coils. Place the coil (or heater) on two sticks over a large bowl. With the aid of a lead funnel pour the acid solution down through the coil. Dip from the bowl and continue to circulate the solution through the coil until the deposit is dissolved. The coil should then be thoroughly washed out with hot water.

The hot-water flow pipe close to a water back or coil frequently becomes thickly covered with scale. If the pipe is brass, it may be disconnected and treated with acid and then washed out with hot water. If it is of galvanized iron and in bad condition, it will probably be more satisfactory to replace it.

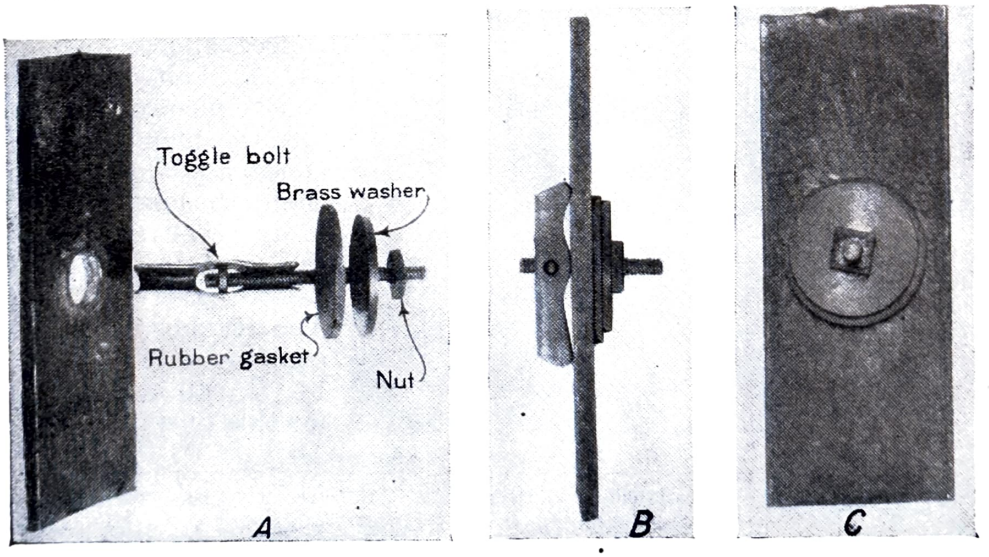
STOPPING LEAKS IN PIPES AND TANKS

A small leak in a water pipe can be stopped in an emergency as follows: Place a flat rubber or leather gasket over the leak and hammer a piece of sheet metal to fit over the gasket; secure both to the pipe with a clamp obtainable at hardware or 5-and-10-cent stores. A small leak under low pressure is sometimes stopped by shutting off the water and then embedding the pipe in richly mixed portland-cement mortar or concrete. Broken sewer pipe can be repaired in like manner, and a wrapping of wire netting embedded in the mortar or concrete increases its strength. It is better, however, to re-lay the sewer and make all joints watertight and rootproof as described in Farmers Bulletin 1950, Sewage and Garbage Disposal on the Farm. A small hole in cast-iron pipe may be tapped for a screw plug.

Where a leaky screw joint cannot be tightened with a pipe wrench, the leak is sometimes stopped with a blunt chisel or calking tool and hammer. Sometimes a crack or hole is cleaned out and then plugged and calked with lead or a commercial iron cement mixed to the consistency of stiff putty. Sometimes a pipe band, a clamp with two bolts (similar to but stronger than the one shown in fig. 14, *C*), or a split sleeve is employed to hold a thin coating of iron cement or a gasket over a leak. If the leak is at a screw joint, the band is usually coated inside with one-eighth of an inch of iron cement and then slipped over the pipe. Keeping the bolt farthest from the coupling or fitting a little tighter than the other, tighten both bolts. During the tightening, the band should be driven with a hammer snugly against the coupling or fitting.

In addition to these methods and devices, there are several kinds of good, inexpensive, ready-made pipe and joint repairers obtainable from manufacturers and dealers.

Figure 13.—Home-made tank repairer. *A*, Passing the link of the toggle bolt through the hole (enlarged) in the tank; *B*, side view of edge of tank with bolt, washers, and nut tightened; *C*, outside view of completed job.



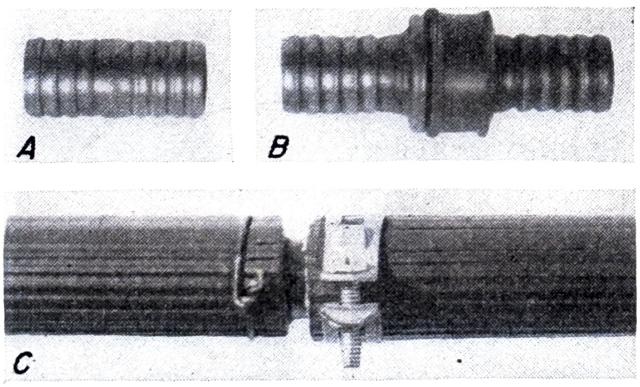
A corroded and leaky spot in a steel tank or range boiler can be closed with an inexpensive repair bolt or plug available at dealers. A home-made repairer consisting of a 3/16- by 3-inch toggle bolt and a flat rubber gasket, brass washer, and nut is shown in figure 13. The link of the bolt, after being passed through the hole, takes an upright position, and screwing up the nut forces the gasket tightly against the outside of the boiler. A small hole must be reamed or enlarged with a round file to a diameter that will admit the toggle bolt. The metal beneath the gasket should be firm and clean. A little candlewick packing may be wrapped around the bolt to prevent leakage along the bolt. Sometimes a hole is closed by driving in a tapered steel pin to turn the metal inward, forming a surface that can be tapped for an ordinary screw plug. A hole in the wall of a tank or pipe having considerable thickness can be easily and quickly closed by screwing in a tapered steel tap plug that cuts and threads its way through the wall. These plugs in different sizes are obtainable from dealers, and a monkey wrench is the only tool required to insert them. It is unnecessary to shut off or drain the water from the tank or pipe.

A small leak at a seam or rivet can often be closed by merely rubbing a cold chisel along the beveled edge of the joint. Do not attempt to calk a seam unless the plates have considerable thickness and the rivets are closely spaced and are close to the calking edge, and then use extreme caution. Run a regular calking tool or blunt chisel along the beveled edge, tapping the tool very lightly with a light hammer to force the edge of the upper plate against and into the lower plate.

REPAIRING CRACKED LAUNDRY TUBS AND GARDEN HOSE

Cracks in slate, soapstone, or cement laundry tubs are made watertight with a mixture of litharge and glycerin or a specially prepared commercial cement. The litharge and glycerin are mixed and stirred to form a smooth heavy paste free from lumps. The crack should be cleaned out to remove all grease and dirt, and the paste should be worked into the crack with a case knife. A paste of portland cement and water or of white of egg and fresh lump lime has been used successfully for this purpose. A break in garden hose can be quickly repaired or two pieces of hose can be joined with an inexpensive iron or brass hose mender or splicer, shown in figure 14, *A*. Cut off the defective piece of hose, insert the mender in the good ends, and wire or clamp the hose as shown in figure 14, *C*. Menders come to slip inside ½-, ¾-, or 1-inch hose. The regular brass hose coupling shown in figure 14, *B*, can also be used for this purpose.

Figure 14.—A, hose menders; *B*, hose coupling; *C*, two pieces of hose joined with a mender—one fastened with wire twisted with pliers, the other clamped.



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